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### Feature Article - Foreign ownership characteristics of business undertaking research and experimental development activity in Australia (Aug, 2002)

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#### SUMMARY

As part of an initiative to expand the data available on economic globalisation issues, the ABS has embarked on a series of studies of the economic activity of majority foreign-owned businesses in Australia<sup>1</sup>.

The most recent study examines the foreign ownership characteristics of businesses undertaking research and experimental development (R&D) activity in 1999-2000, with the results showing a significant contribution by majority foreign-owned businesses. Majority USA-owned businesses made the largest contribution to R&D activity of all foreign-owned businesses to the extent that they contributed more expenditure and human resources devoted to R&D than all other foreign-owned businesses combined. Majority foreign-owned businesses dominated R&D activity by wholesale and retail businesses, both in terms of R&D expenditure and human resources devoted to R&D. However the overall level of R&D in these industries was relatively low.

The manufacturing industry contributed more than any other to total R&D activity, and this contribution was shared evenly between majority foreign-owned and majority Australian-owned businesses.

#### INTRODUCTION

Economic globalisation is not a new phenomenon: countries have conducted trade for centuries. However, the intensity of international activity and interdependency of economies gathered pace rapidly over the 1980s and 90s, and has given rise to economic, social and environmental issues which need to be taken into account by policy makers and economic analysts. A working party under the sponsorship of the OECD is developing a framework to guide national statistical agencies in their development of statistical indicators of economic globalisation.

This framework for statistical indicators is currently in draft form (**Manual on Economic Globalisation Indicators** OECD, Paris, in progress). It outlines three sets of indicators necessary to measure economic globalisation:

- Indicators relating to trade.
- Indicators of foreign direct investment and the structure and activities of multinational firms.
- Indicators of the international dissemination of technology.

The ABS has for some time compiled traditional economic indicators for foreign trade and foreign

direct investment. These data give some structural information, however, the ABS has not normally compiled data for the economic activity of multinational firms, nor the international dissemination of technology. The ABS has therefore embarked on a series of case studies to test the feasibility of synthesizing activity data for foreign-owned businesses and indicators of technology dissemination by blending data from a number of sources. Early studies examined new capital expenditure by foreign-owned businesses, the economic activity of foreign-owned business in the mining industry and the economic activity of foreign-owned businesses specialising in information technology.

This current study addresses the area of international dissemination of technology by creating indicators for research and development activity by majority foreign-owned businesses<sup>2</sup>.

## DATA SOURCES

This study uses data collected by the ABS as part of the Survey of Research and Experimental Development in respect of the year ended June 2000, published in **Research and Experimental Development, Businesses, 1999-2000** (ABS Cat. no. 8104.0). This survey sought data from all businesses identified by the ABS as likely to be undertaking R&D. Businesses responding to the R&D survey were linked to their foreign ownership characteristics from the ABS Survey of International Investment for those businesses included in both surveys.

For other businesses, a number of sources were used, with most ownership data compiled from extensive internet searches. For those businesses where the ABS was not able to determine ownership characteristics, data were imputed based on the ownership characteristics of other, similar businesses. This is discussed further in the Appendix: Businesses with Unknown Ownership.

Since the work reported in this article was completed, the ABS has released **Research and Experimental Development, Businesses, 2000-2001** (ABS Cat. no. 8104.0).

## SCOPE OF THIS STUDY

The ABS compiles a range of R&D statistics for government and non-profit organisations, higher education organisations and businesses. This study aims to provide experimental indicators of international technology dissemination by foreign-owned businesses, and therefore focuses on R&D expenditure by businesses only.

## RESULTS

In 1999-2000, expenditure on R&D by all businesses in Australia was estimated to be \$4,045m in current price terms, down slightly from \$4,068m in 1998-1999, following a pattern of small annual falls from the 1995-1996 financial year. The recently released estimates for 2000-2001 show an expenditure of \$4,828 in current price terms, an increase of 18% over the previous year, and reversing the decline in previous years.

In 1999-2000, foreign-owned businesses made a significant contribution to Australia's R&D activity (see Table 1), spending \$1,690m (42% of total R&D expenditure) and investing 10,747 person years (41% of total human resources devoted to R&D). Both Australian and foreign-owned businesses invested approximately 10% of their total R&D expenditure on capital items, however foreign-owned businesses spent a slightly higher proportion of their total expenditure on labour costs than Australian-owned businesses (47% and 43%, respectively) and a slightly lower

proportion on other current expenses (44% and 47%, respectively).

**TABLE 1. TOTAL R&D EXPENDITURE AND HUMAN RESOURCES DEVOTED TO R&D, 1999-2000**

	Expenditure						Human Resources	
	Capital Expenditure		Labour Costs		Other Current Expenditure		Total	
	\$m	%	\$m	%	\$m	%	\$m	%
Australian	241.1	61	1 008.9	56	1 104.9	60	2 354.9	58
% of Aust exp		10		43		47		100
Foreign	152.8	39	787.8	44	749.8	40	1 690.4	42
% of foreign exp		9		47		44		100
Total	393.9	100	1 796.7	100	1 854.7	100	4 045.3	100

For the mining industry (see Table 2), foreign-owned businesses had significantly less R&D expenditure than Australian-owned businesses (\$97m and \$176m respectively) and devoted fewer human resources to R&D (331 person years and 419 person years respectively). However, foreign-owned businesses reported higher capital expenditure on R&D than Australian-owned businesses (\$18m and \$10m respectively), which differs from the expenditure patterns for all other major industries.

**TABLE 2. TYPE OF R&D EXPENDITURE, MINING INDUSTRY, 1999-2000**

	Expenditure						Human Resources	
	Capital Expenditure		Labour Costs		Other Current Expenditure		Total	
	\$m	%	\$m	%	\$m	%	\$m	%
Australian	10.1	36	39.9	66	125.9	68	176.0	65
Foreign	17.7	64	20.4	34	58.6	32	96.7	35
Total	27.8	100	60.3	100	18.4	100	272.7	100

On an industry basis, R&D activity was dominated by businesses in the manufacturing industry. Foreign-owned manufacturing businesses (see Table 3) contributed strongly to R&D, accounting for 45% of total manufacturing R&D expenditure and 44% of human resources. Of the R&D expenditure by businesses manufacturing motor vehicles and parts and other transport equipment, \$295m (70%) was attributed to foreign-owned businesses, while for manufacturers of petroleum, coal, chemical and associated products, \$226m (55%) was attributed to foreign-owned businesses. Human resources devoted to R&D by both these types of manufacturers was also dominated by foreign-owned businesses (71% of the total for manufacturers of motor vehicles and parts and other transport equipment and 52% of the total for petroleum, coal, chemical and associated products).

**TABLE 3. TYPE OF R&D EXPENDITURE, DETAILED MANUFACTURING INDUSTRY, 1999-2000**

	Expenditure				Human Resources	
	Capital Expenditure		Labour Costs		Total	

	\$m	%	\$m	%	\$m	%	\$m	%	Person Years	%
MOTOR VEHICLE AND PARTS AND OTHER TRANSPORT EQUIPMENT										
Australian	12.9	54	46.4	27	65.9	30	125.2	30	895	29
Foreign	10.9	46	127.5	73	156.3	70	294.8	70	2 178	71
Total	23.8	100	173.9	100	222.3	100	420	100	3 074	100
PETROLEUM, COAL, CHEMICAL AND ASSOCIATED PRODUCTS										
Australian	49.4	65	72.3	45	66	37	187.7	45	1 118	48
Foreign	26.3	35	88	55	111.4	63	225.6	55	1 228	52
Total	75.7	100	160.3	100	177.3	100	413.3	100	2 347	100
ELECTRONIC AND ELECTRICAL EQUIPMENT AND APPLIANCES										
Australian	8.2	38	86.9	46	69.1	52	164.2	48	1 473	53
Foreign	13.5	62	100.4	54	64.2	48	178.2	52	1 291	47
Total	21.7	100	187.3	100	133.3	100	342.4	100	2 764	100
OTHER MANUFACTURING										
Australian	60.3	73	283.6	72	299.1	75	643	73	4 461	75
Foreign	22.1	27	109	28	102.3	25	233.3	27	1 467	25
Total	82.4	100	392.6	100	401.3	100	876.3	100	5 927	100
TOTAL MANUFACTURING										
Australian	130.8	64	489.2	54	500.1	54	1 120.2	55	7 947	56
Foreign	72.8	36	424.9	46	434.2	46	931.9	45	6 164	44
Total	203.6	100	914.2	100	934.3	100	2 052.1	100	14 111	100

For the wholesale and retail industries (see Table 4), foreign-owned businesses dominated R&D expenditure and human resources, spending \$265m (75% of the industry total) and investing 1,681 person years (68% of the industry total). This domination of R&D expenditure was across the board, with capital expenditure, labour costs and other current expenditure at 74%, 72% and 79% respectively.

**TABLE 4. TYPE OF R&D EXPENDITURE, WHOLESALE AND RETAIL INDUSTRIES, 1999-2000**

	Expenditure						Human Resources			
	Capital Expenditure		Labour Costs		Other Current Expenditure		Total		Person Years	%
	\$m	%	\$m	%	\$m	%	\$m	%		
Australian	9.7	26	46.9	28	30.3	21	87.0	25	794	32
Foreign	27.1	74	122.1	72	116.3	79	265.4	75	1 681	68
Total	36.8	100	169.0	100	146.6	100	352.4	100	2 475	100

For the property and business services industry, R&D indicators for businesses involved in scientific research have been compiled separately to assist analysis (see Tables 5 and 6). For businesses involved in the property and business services industry (but not scientific research), the proportion of total R&D expenditure by foreign-owned businesses was similar to the all industries total (45% and 42% respectively). In contrast, for businesses mainly involved in

scientific research, the proportion of total R&D expenditure by foreign-owned businesses was relatively low (8%).

**TABLE 5. TYPE OF R&D EXPENDITURE, PROPERTY & BUSINESS SERVICES INDUSTRY (EXCLUDING SCIENTIFIC RESEARCH), 1999-2000**

	Expenditure								Human Resources	
	Capital Expenditure		Labour Costs		Other Current Expenditure		Total			
	\$m	%	\$m	%	\$m	%	\$m	%	Person Years	%
Australian	24.5	58	243	56	125	51	392.5	55	3 658	63
Foreign	18	42	187.5	44	121.9	49	327.4	45	2 126	37
Total	42.5	100	430.5	100	246.9	100	719.9	100	5 784	100

**TABLE 6. TYPE OF R&D EXPENDITURE, SCIENTIFIC RESEARCH INDUSTRY, 1999-2000**

										Expenditure	Human Resources		
										Total			
Capital Expenditure		Labour Costs		Other Current Expenditure									
	\$m	%	\$m	%	\$m	%	\$m	%	Person Years	%			
Australian n.p.			81.8	93	n.p.		192.5	92	1 203	93			
Foreign n.p.			6.2	7	n.p.		17.6	8	86	7			
Total	21.3	100	88.1	100	100.8	100	210.1	100	1 289	100			

n.p. not published due to confidentiality

**TABLE 7. TYPE OF R&D EXPENDITURE, OTHER INDUSTRIES N.E.C., 1999-2000**

Expenditure								Human Resources		
Capital Expenditure		Labour Costs		Other Current Expenditure		Total				
\$m	%	\$m	%	\$m	%	\$m	%	Person Years	%	
Australian n.p.		108	80	n.p.		386.8	88	1 342	79	
Foreign n.p.		26.7	20	n.p.		51.4	12	359	21	
Total	61.8	100	134.7	100	241.6	100	438.2	100	1 701	100

n.p. not published due to confidentiality

Table 8 presents R&D indicators by country of majority ownership and provides estimates for businesses' source of R&D funds. The source of R&D funds has been aggregated into three main groups. Own Funds are the funds that are set aside by businesses for R&D as a normal part of their day-to-day activity, while Other Australian Funds are those funds sourced from other Australian-based businesses, Commonwealth government grants, other government funding and

other funds. Overseas Funds are those funds that flow into Australia for R&D purposes.

**TABLE 8. INDICATORS FOR R&D BY COUNTRY OF MAJORITY OWNERSHIP, 1999-2000**

	Source of Funds						Total Expenditure Human Resources			
	Own Funds		Other Australian Funds		Overseas Funds					
	\$m	%	\$m	%	\$m	%	\$m	%	Person Years	%
Australian	2 062.5	58	259.6	84	32.8	17	2 354.9	58	15 362	59
USA	769.1	22	23.8	8	99.6	52	892.5	22	6 187	24
European Union	448.5	13	16.5	5	12.4	7	477.4	12	2 878	11
Other	265.9	7	9.3	3	45.3	24	320.5	8	1 682	6
Total	3 546.0	100	309.1	100	190.2	100	4 045.3	100	26 109	100

Table 8 shows that businesses with majority ownership from the USA had a total R&D expenditure of \$893m (22% of total expenditure), more than the combined total for all other foreign-owned businesses. Most funding for businesses owned by major countries was sourced from funds generated from within the resident businesses. In contrast, the use of other Australian funds for R&D activity was dominated by Australian-owned businesses, while the use of overseas funds was dominated by foreign-owned businesses, mostly those with majority USA ownership. Businesses that were majority USA-owned used more than half of all funds that flowed into Australia for R&D purposes.

**TABLE 9. INDICATORS FOR R&D BY SIZE OF BUSINESS**

	Total Expenditure		Human Resources	
	\$m	%	Person Years	%
Small Businesses (employment 0-19)				
Australian	289.5	7	2 731	10
Foreign	110.1	3	1 031	4
Total	399.6	10	3 762	14
Medium Businesses (employment 20-199)				
Australian	869.9	22	6 880	26
Foreign	342	8	2 225	9
Total	1 212.0	30	9 105	35
Large Businesses (employment 200+)				
Australian	1 195.5	30	5 751	22
Foreign	1 238.3	31	7 490	29
Total	2 433.8	60	13 242	51

Note: For confidentiality reasons it was necessary to combine some of the size categories used in Cat. no. 8104.0.

Large foreign-owned businesses (those with employment of 200 or more) had the same share of R&D expenditure and human resources, both approximately 30% (see Table 9). This close correspondence between R&D expenditure and human resources for foreign-owned businesses

continued in the medium and small business size ranges. Conversely, while large Australian-owned businesses, with 30% of R&D expenditure, used only 22% of human resources, smaller Australian-owned businesses had a proportionately smaller share of R&D expenditure than human resources.

## **OTHER STUDIES**

Several globalisation case studies were undertaken prior to this exercise<sup>3</sup>. They examined the foreign ownership characteristics of businesses in other areas of interest. The study of businesses in the mining industry in 1997-1998 showed that foreign-owned businesses made a larger contribution to industry turnover than Australian-owned businesses (56% and 43% respectively), but a lower contribution to industry employment (40% and 59% respectively) and capital expenditure (34% and 59% respectively). Foreign-owned and Australian-owned businesses contributed similar amounts to expenditure on wages and salaries by the mining industry (50% and 49%).

A study of the ownership of businesses undertaking capital expenditure for the 1998-1999 financial year showed the lower contribution of foreign-owned businesses to capital expenditure was not restricted to the mining industry, with the capital expenditure by foreign-owned businesses across all industries estimated at \$11.5b (26%) and capital expenditure by Australian-owned businesses estimated at \$27.9b (62%).

The study of the foreign ownership characteristics of information technology businesses in the 1998-1999 financial year showed a strong contribution by foreign-owned businesses. Foreign-owned businesses provided more employment than Australian-owned businesses (43% and 29% respectively) and gained higher total income (62% and 25% respectively). USA-owned businesses had the largest economic activity of foreign-owned businesses to the extent that they rivalled Australian businesses in terms of employment (26% and 29% respectively) and exceeded Australian-owned businesses in terms of income (32% and 25% respectively).

Further studies are underway to investigate the foreign ownership characteristics of information technology businesses in respect of the 2000-2001 financial year and to profile the characteristics and activities of importing and exporting businesses.

## **FURTHER INFORMATION**

For more information about the foreign ownership of businesses undertaking R&D expenditure, contact Glen Malam on 02 6252 5040 or email [glen.malam@abs.gov.au](mailto:glen.malam@abs.gov.au)

## **ENDNOTES**

1. Business are determined to be majority foreign-owned if more than 50% of their equity is held by foreigners.
2. hereafter the word 'majority' is omitted but it is implied.
3. Totals for previous studies did not all add to 100% because in those studies, ownership was not established or imputed for some businesses. See Appendix 1 for this study.

## **REFERENCES**

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**Research and Experimental Development, Businesses, Australia, 1999-2000** (Cat. no. 8104.0)

**Research and Experimental Development, Businesses, Australia, 2000-2001** (Cat. no. 8104.0)

**Research and Experimental Development, All Sector Summary, Australia, 1998-1999** (Cat. no. 8112.0)

**The Measurement of Scientific and Technological Activities** ('Frascati Manual' 1993) OECD, Paris, 1994

## APPENDIX 1 BUSINESSES WITH UNKNOWN OWNERSHIP

When conducting this study, it was not possible to establish the country of ownership for a significant number of units (see Table A for their values). Detailed analysis of these unknown units showed that the overwhelming majority were either small or medium sized businesses. However, there were no reliable patterns of unknown business size or industry upon which assumptions of ownership could be based.

**TABLE A. TOTAL R&D EXPENDITURE AND HUMAN RESOURCES DEVOTED TO R&D, 1999-2000**

	Expenditure						Human Resources			
	Capital Expenditure		Labour Costs		Other Current Expenditure		Total			
	\$m	%	\$m	%	\$m	%	\$m	%	Person Years	
Australian	204.5	52	765.9	43	965.3	52	1 935.7	48	10.9	42
Foreign	140.1	36	702.6	39	711.6	38	1 554.3	38	9.3	36
Unknown	49.3	13	328.2	18	177.8	10	555.4	14	6.0	23
Total	393.9	100	1 796.7	100	1 854.7	100	4 045.3	100	26.1	100

To create the data used in the main body of this paper, a country of ownership was imputed for each of the unknown units based on the ownership characteristics of similar businesses. All R&D units were stratified by size (large, medium and small businesses) and by fine industry detail. Within each stratum, the predominant country of ownership for known businesses was imputed as the country of ownership for any unknowns within that stratum.

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